Australian National University

The Emissions Reduction Fund's Landfill Gas Method: An Assessment of its Integrity

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Executive summary

The available data provide compelling evidence that the majority of the abatement credited under the Emissions Reduction Fund's (ERF) landfill gas methods has not been additional. It appears that in the order of 2/3^{rds} of the abatement credited under the methods would have occurred in the absence of the incentive provided by the issuance of ACCUs. The non-additional abatement credited under these methods equates to approximately 19.5 million Australian carbon credit units (ACCUs), or almost 20% of the total number of ACCUs issued under the ERF to the end of 2021. These credits are likely to have been worth more than $300 million.

The primary flaw in the landfill gas methods is that they do not contain any measures to mitigate the risks associated with financial additionality – the risk the abatement would occur anyway because the activity is profitable without carbon credits. Landfill gas projects that generate electricity (generation projects) can earn revenue through the sale of electricity and LGCs, meaning there is a significant incentive for the activity to be undertaken without the need for ACCUs. This risk is greatest in large sites that are able to benefit from the significant economies of scale that are associated with the operation of landfill gas capture and combustion systems. The additionality problems appear to relate mostly to these larger sites, particularly the 20 largest landfill gas projects that account for almost 70% of the ACCUs that have been issued under the methods.

A further problem with the landfill gas methods is they have allowed old generation projects to transition into the ERF and onto new methods and to carry over their historical baselines. This has allowed the majority of the 20 largest projects in Australia to have baselines of 24% of the methane (CH_4) captured by the projects, below the default of 30%, and for some large projects to have a baseline of 0%. Because the method's only measure for addressing additionality risks is the baseline, projects with a 0% baseline are free from additionality constraints. This aspect of the method is based on the assumption that, if these projects did not receive ACCUs, the relevant landfills would not capture and destroy any CH_4. This is plausible at some smaller and closed landfills but is inconceivable for larger landfills, which are all regulated under state and territory environmental laws and are required to capture and destroy a proportion of the biogas released from the site to mitigate odour and safety risks.

In 2018, the Emissions Reduction Assurance Committee (ERAC) – the committee responsible for ensuring the integrity of the ERF's methods – conducted a crediting period extension review on the original ERF method and found that generation projects were likely to continue in the absence of the incentive provided by the ERF and that extending the crediting period for generation projects was not likely to lead to the registration of new projects. On this basis, the ERAC recommended that the crediting period for generation projects should not be extended. This should have addressed the additionality concerns associated with generation projects. Generation projects would have one, 7-year crediting period as was originally intended and then cease receiving ACCUs. However, In late 2021, the Minister for Emissions Reductions decided to grant these projects a further 5-year extension. In order to do this, he had to make a new method (the new generation-only method) so as to get around the ERAC's original advice.

Despite compelling evidence that the majority of the abatement issued under the methods has been non-additional, and prevailing market conditions strongly suggesting the largest generation projects will remain viable without ACCUs until at least 2025, the ERAC found the new generation-only method satisfied the offsets integrity standards. The key question is how;

how, in light of the available evidence could the ERAC reasonably conclude the method satisfies the offsets integrity standards?

For the ERAC to reach this conclusion it would need to be satisfied there was *compelling evidence* that:

a) large generation projects need ACCUs to continue operating – i.e. they are likely to shut down or substantially reduce their biogas capture and combustion rates if they do not continue to receive ACCUs for a further 5 years; and

b) the baselines are appropriately calibrated to account for the regulatory and market factors that incentivise the activity if ACCUs are not provided.

However, the available evidence suggests:

- there are material financial incentives for generation projects to operate, even without ACCUs, because they can receive revenue from the sale of both electricity and LGCs;
- the new generation-only method contains no measures to mitigate the risks associated with financial additionality;
- the new generation-only method allows all of the large generation projects to continue to use the baselines they have been using to date, including those on baselines of 0% and 24%, which are below the minimum 30% level recommended by the ERAC in 2019; and
- electricity and LGC prices are likely to remain in a range that is sufficient to ensure the continued profitability of the larger generation projects that account for the majority of the ACCUs until at least 2025.

The ERAC has claimed its decision to support the method was based on 'new analysis'. However, neither the analysis nor any information on its coverage of projects, price assumptions or how it was conducted has been released.

If the ERAC and Minister are unable to provide compelling evidence that supports their decisions, the new generation-only method should be revoked and replaced with a method that employs a tiered baseline system, where projects receive different baseline capture rates that account for the economies of scale associated with their operation.

Another option is to exclude all generation projects from the ERF and use an alternative policy mechanism, such as government power purchase agreements, to incentivise generation at landfills. Using ACCUs to incentivise landfill gas generation is problematic because of the extent of the financial additionality risks and the unpredictability of electricity and LGC prices. Price increases can render abatement non-additional, meaning the issuance of credits can result in higher emissions than would otherwise occur (i.e. if the credits are used to offset emissions from other sources). Equally, if electricity and LGC prices decrease significantly, it could force operators to scale back investment in the site, resulting in reductions in their capacity to capture and combust CH_4. Having the government enter into power purchase agreements with landfill generators could avoid this issue and the associated risks of over-crediting or project closure (or reductions in abatement caused by decreases in electricity and LGC prices).

While most of the abatement credited under the ERF's landfill gas method is unlikely to be additional, and the new generation-only method does not appear to satisfy the offsets integrity standards, it is important to emphasise that there are legitimate landfill gas projects that are likely to have generated, and continue to generate, real and additional abatement. Flaring-only projects, and many small- to medium-sized generation projects, are likely to need additional incentives beyond the ability to sell electricity and LGCs to be viable. The different characteristics of these projects relative to the large generation projects needs to be accounted for in the design of policy incentives for the sector.

1. Introduction

In late 2021, the Australian Government committed to an aspirational 2050 net zero greenhouse gas emissions target and published a *Long-Term Emissions Reduction Plan* that sets out a high-level strategy for achieving the objective.[1] While the plan references a number of pre-existing initiatives, the main policy instrument the Australian Government is relying on to directly incentivise emissions reductions is the Emissions Reduction Fund (ERF).

The ERF is a $4.5 billion program that provides for:

a. the issuance of carbon credits (known as Australian carbon credit units (ACCUs)) to offset projects that abate greenhouse gas emissions; and

b. the purchase of ACCUs from registered offset projects by the Clean Energy Regulator.

The scheme is built on the Australian Labor Party's (ALP) Government's Carbon Farming Initiative (CFI). The CFI was an offset scheme that applied to the agriculture, land and waste sectors under the ALP Government's broader carbon pricing mechanism.[2] Facilities with carbon liabilities under the carbon pricing mechanism could surrender offsets purchased from offset projects registered under the CFI to meet their obligations. The aim of the CFI was to realise abatement from sectors that were hard to price and thereby reduce the cost of achieving Australia's emission reduction targets.

When the Liberal-National Party Coalition took office in 2013, it abolished the carbon pricing mechanism and replace it with the ERF, which is essentially an expanded version of the CFI. Under the ERF, offsets can be generated from all sectors of the economy – not just agriculture, land and waste. In addition, the main source of demand for ACCUs under the ERF is intended to be Clean Energy Regulator, who purchases abatement on behalf of the Australian Government. ACCUs are also purchased by facilities with carbon liabilities under the Safeguard Mechanism – a regulatory mechanism that places caps on net emissions from facilities that emit more than 100,000 tonnes of carbon dioxide equivalent (tCO_2-e) per annum.[3] However, the caps under the Safeguard Mechanism are lax, meaning that, to date, covered facilities have had little need to surrender ACCUs to meet their obligations.[4] The only other source of demand for ACCUs under the current policy settings comes from voluntary buyers; entities that want to voluntarily offset their emissions for marketing and altruist reasons.

In theory, the main implication of the Coalition Government's decision to abolish the carbon pricing mechanism and replace it with the ERF is that it meant the Australian taxpayer would now pay for emission reductions – not major emitters or consumers, as would occur with the Gillard Government's carbon pricing mechanism. However, of possibly greater importance is it means the effectiveness of the policy is dependent on the integrity of the offsets. For the ERF to drive down Australia's emissions, the ACCUs issued under the scheme must represent abatement that is both real and additional to what would otherwise occur. In the absence of

[1] Australian Government (2021) *Australia's Long-Term Emissions Reduction Plan: A whole-of-economy Plan to achieve net zero emissions by 2050*. Commonwealth of Australia, Canberra.
[2] The carbon pricing mechanism commenced on 1 July 2012. The scheme was highly controversial and was opposed by the Opposition (Liberal-National Party Coalition).
[3] *National Greenhouse and Energy Reporting Act 2007* (Cth); *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015*.
[4] Clean Energy Regulator (2021) 'Safeguard facility reported emissions'. Available at: http://www.cleanenergyregulator.gov.au/NGER/National%20greenhouse%20and%20energy%20reporting%20data/safeguard-facility-reported-emissions (20 February 2022).

integrity, the ERF merely facilitates the payment of people for non-existent emissions reductions and/or to do what they were already going to do.

The importance of integrity is reflected in the *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth) (the CFI Act), which requires all ERF methods to meet six offsets integrity standards.[5]

- The methods must result in additional carbon abatement, being abatement that would not occur in the ordinary course of events without the incentive provided by the ERF.
- The emissions, removals and abatement that are estimated under the methods must be measurable and verifiable.
- The methods must ensure the carbon abatement that is credited is able to be used to meet Australia's climate change targets.
- The methods must be supported by 'clear and convincing evidence'.
- The methods must account for any material emissions that occur as a consequence of offset projects.
- The estimates, projections and assumptions used in the methods must be conservative.

To date, the abatement of methane (CH_4) emissions from solid waste landfills has been one of the most popular offset activities under the ERF. When biodegradable materials are deposited in landfills, they generally decompose anaerobically (in the absence of oxygen). The anaerobic decomposition of biodegradable materials in landfills results in the production of landfill gas, roughly 50% of which is typically CH_4.[6] CH_4 is a potent greenhouse gas, with a 100-year global warming potential 28 times greater than carbon dioxide (CO_2).[7] Landfill gas projects abate emissions by capturing landfill gas emitted from the sites and burning the CH_4 using either a flare or an electricity generator.

As of December 2021, landfill gas projects accounted for 28% of all ACCUs issued under the ERF; the second most of any project type under the ERF behind Human-induced Regeneration.[8] They also constituted 11% of registered projects and accounted for 4% of abatement contracted by the Clean Energy Regulator.[9]

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[5] Carbon Credits (Carbon Farming Initiative) Act 2011 (Cth), s 133; Emissions Reduction Assurance Committee (2021). *Information Paper: Committee considerations for interpreting the Emissions Reduction Fund's offsets integrity standards*. Version 2.0, March 2021.
[6] National Greenhouse and Energy Reporting (Measurement) Determination 2008, s 5.14C.
[7] Myhre, G. et al. (2013) 'Anthropogenic and Natural Radiative Forcing'. In: Stocker, T.F. et al. (eds.) *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge.
[8] The ACCUs issued to landfill vs human-induced regeneration projects are very similar. As at December 2021, 29.1 million ACCUs had been issued to landfill projects, compared to 29.3 million to human-induced regeneration projects. Clean Energy Regulator (2021) 'Emissions Reduction Fund project register', 19 December 2021. Available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register (20 February 2022).
[9] Clean Energy Regulator (2021) 'Emissions Reduction Fund project register', 19 December 2021. Available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register (20 February 2022); Clean Energy Regulator (2021) 'Carbon abatement contract register', December 2021. Available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/carbon-abatement-contract-register (20 February 2022).

Given the significance of landfill gas projects in the ERF, it is crucial that the ACCUs that are issued to these projects represent real and additional abatement. The importance of this issue has been heightened by the Minister for Emissions Reduction's recent decision to create a new landfill gas method to facilitate the extension of the crediting periods of landfill projects that generate electricity by a further 5-years. This paper explores the extent to which the abatement credited to ERF landfill gas projects is additional and whether there is sufficient evidence to warrant the extension of the crediting periods of generation projects.

The remainder of the paper is set out as follows. Section 2 provides an overview of the ERF's landfill gas methods. Section 3 analyses the integrity risks associated with landfill gas projects and the design of the method. Section 4 discusses the Emissions Reduction Assurance Committee's review of the method in 2018 and why the Minister thought it necessary to create the new generation method. Section 5 presents an analysis of the additionality of the abatement credited under the landfill gas methods to 2021. Section 6 looks at the evidence to support the new method and section 7 concludes with implications and recommendations.

2. Overview of the landfill gas methods

Due to the legacy of the transition from the CFI to the ERF, and past method changes, landfill gas projects are currently registered under four separate methods. There were two landfill gas methods created under the CFI in late 2012: *Carbon Farming (Capture and Combustion of Methane in Landfill Gas from Legacy Waste) Methodology Determination 2012*; and *Carbon Credits (Carbon Farming Initiative) (Capture and Combustion of Methane in Landfill Gas from Legacy Waste: Upgrade Projects) Methodology Determination 2012*. Both of these methods were repealed in July 2015 following the commencement of the ERF and replaced with the *Carbon Credits (Carbon Farming Initiative — Landfill Gas) Methodology Determination 2015* (referred to here as the 'original ERF method'). In late 2021, a new landfill gas method was made, known as the *Carbon Credits (Carbon Farming Initiative — Electricity Generation from Landfill Gas) Methodology Determination 2021* ('new generation-only ERF method').

All four of the landfill gas methods share the same core elements – the main difference relates to the coverage of project and waste types. The historic CFI methods only applied to 'legacy waste', or biodegradable organic matter deposited at landfill facilities before 1 July 2012 (when the carbon pricing mechanism commenced). The ERF methods apply to the capture of all CH_4 from landfills, other than CH_4 that emanates from waste deposited between 1 July 2012 and 30 June 2014 (i.e. the period when the carbon pricing mechanism was in operation).[10]

The distinction between the two ERF methods relates mainly to project types. There are two types of landfill gas projects: projects that capture and combust landfill gas for electricity generation (generation projects); and projects that only capture and flare landfill gas (flaring-only projects).[11] As its name suggests, the new generation-only ERF method applies to generation projects only. The original ERF method applies to both generation and flaring-only projects.

Save for their coverage, the structure of the two ERF methods are similar. Projects must capture and combust of the CH_4 component of biogas from landfills. The abatement that is credited (the

[10] The exclusion of carbon tax waste was intended to prevent landfill operators from earning offsets from emissions that were already subject to a carbon price.
[11] Generation projects also typically have flares to deal with excess gas.

'net abatement amount') to projects is calculated as the difference between the project abatement and the baseline abatement.

- Project abatement is calculated as the difference between the amount of CH_4 that is combusted by the project less the amount of CH_4 that would have oxidised in near surface conditions in the absence of the project.

- Baseline abatement is calculated as the amount of CH_4 that is combusted by the project multiplied by a proportion that is meant to reflect the amount of CH_4 that would have been combusted at the site to meet regulatory requirements imposed under state and territory environmental laws. This proportion is calculated as the higher of a 'regulatory proportion' (the amount the operator is required to capture and combust under state/territory regulatory requirements) and a 'default proportion' of 30% of the biogas that is captured and combusted by the project.[12] Landfill gas projects that were previously registered under the NSW Greenhouse Gas Abatement Scheme (NSW GGAS) and the Australian Government's Greenhouse Friendly scheme (now Climate Active) were allowed to transition into the CFI, and then from the CFI into the ERF, and different measurement rules were created for these projects. In calculating their baseline abatement, these projects are able to use the proportion that applied under the previous schemes. Projects that transitioned from the NSW Greenhouse Gas Abatement Scheme (NSW GGAS) get to use a regulatory proportion of 24% of the biogas that is captured and combusted by the project, while those that transitioned from the old Greenhouse Friendly scheme have a regulatory proportion of 0%.

The requirement in the method to make a deduction to account for regulatory requirements (other than projects that transitioned from Greenhouse Friendly) reflects the fact that landfills are regulated facilities under state and territory environmental laws and that the licence conditions imposed on landfills generally require them to manage the biogas emitted from the facilities to minimise odour and safety risks. In the absence of measures to control biogas, landfills can cause discomfort to surrounding land users and, in some circumstances, the gas can ignite and explode. The abatement that arises from the steps taken to meet these regulatory requirements needs to be deducted to avoid crediting emission reductions that would occur in the absence of the incentive provided by the ERF. However, there is variability in the regulatory requirements that apply to landfills, both between and within jurisdictions. The regulatory requirements are also often crafted in imprecise terms concerning the minimisation of odour effects and mitigation of safety risks. It is relatively rare for sites to be required to capture and combust specific amounts of landfill gas. The default proportion was included in the method to overcome the difficulty of converting the imprecise regulatory requirements into a quantity of biogas. It is understood that most projects use the default proportion or the proportion that applied under the NSW GGAS or Greenhouse Friendly. Where operators use the regulatory proportion, it is understood that it is generally less than 30%.

[12] It is important to note that the default proportion (and the baseline that applies to transitioning projects) is calculated on the basis of the biogas that is captured and combusted by the project; not off the total amount of CH_4 that is emitted from the site. The 30% default proportion equates to approximately 15-20% of the total CH_4 emitted by landfills. Emissions Reduction Assurance Committee (ERAC) (2019) *Review of the Landfill Gas Method*. Commonwealth of Australia, Canberra.

3. Integrity risks associated with the landfill gas methods

Concerns have been raised about the integrity of the abatement credited under the landfill gas methods since they were first made. There are potential measurement-related integrity issues associated with the methods, particularly in relation to the fraction of landfill gas that is CH_4 and the amount of CH_4 that would have been oxidised in the baseline scenario. However, the primary integrity concern with the methods has always centred on the additionality of the abatement: would the abatement that is credited have occurred anyway?[13]

Part of the reason for the concern about the additionality of the credited abatement is that, of the approximately 111 discrete registered projects, 50 were established before the CFI was established. Approximately 37 of these projects were registered under the NSW GGAS, and the remaining 13 were registered under Greenhouse Friendly, meaning they have been receiving credits since the early- to mid-2000s.

A related concern about the methods is that, while they have some measures to control for regulatory additionality, they contain no measures that seek to mitigate the risks associated with financial additionality. Regulatory additionality refers to whether abatement would occur anyway because there is a mandatory legal obligation to undertake the abatement activity. Financial additionality refers to whether abatement would occur anyway because the abatement activity is profitable without ACCUs.

For projects to be registered under the ERF, they are meant to meet three high-level additionality requirements:

- the newness requirement – the project must not have commenced prior to registration;
- the regulatory additionality requirement – the project must not be required to be carried out by or under a law of the Commonwealth, a State or a Territory; and
- the government program requirement – the project must not be likely to be carried out under another government program or scheme in the absence of the ERF.

These project-level additionality requirements are meant to complement the methods by mitigating the risks associated with regulatory and financial additionality and, on a cursory reading, they should exclude most landfill gas projects. Projects that existed before the ERF commenced should fall foul of the newness requirement. Most medium to large landfills, and many small landfills, are required by law to control biogas, meaning they should fall foul of the regulatory additionality requirement. Further, most generation projects receive large-scale generation certificates (LGCs) under the Renewable Energy Target scheme, meaning they should fall foul of the government program requirement. However, these additionality requirements are only triggered by registration and projects can be exempt from these requirements through the operation of what are known as 'in lieu' requirements contained in the methods or the *Carbon Credits (Carbon Farming Initiative) Rule 2015* (CFI Rule).

[13] Baxter, T., Gilligan, G. (2017) Verification and Australia's emissions reduction fund: integrity undermined through the landfill gas method? *Australian Journal of Environmental Law* 4, 1-29; Hannam, P. (2016) '$200m tipped into landfill firms by government's Direct Action dubbed a waste'. *Sydney Morning Herald*, 29 June.

- Newness requirement. Under the landfill gas methods, projects that existed before the ERF commenced are largely exempt from the newness requirement because it only applies to projects seeking registration. Projects that operated under the NSW GGAS and Greenhouse Friendly were allowed to transition into the CFI and, once registered under the CFI, they did not have to re-register under the ERF. Without a requirement to register, none of the additionality requirements are triggered. The ERF landfill gas methods also contain an in lieu provision that applies to recommencing projects – those that previously operated, closed and then restarted – that exempts them from the newness requirement.

- Regulatory additionality requirement. The CFI Act's regulatory additionality requirement does not apply to any landfill gas project – regardless of when it was established – because of an in lieu requirement that merely provides that 'a requirement in lieu of the regulatory additionality requirement is that the project is a landfill gas project'.[14]

- Government program requirement. Landfill gas projects are largely exempt from the government program requirement because the nature of the requirement has been altered by an in lieu requirement in the CFI Rule. This provision does away with the broadly cast requirement in the Act and substitutes a list of government programs. Only government programs that are included on the list in section 21 of the CFI Rule trigger the government program requirement. This list currently includes projects that involve the operation of an accredited power station within the meaning of the *Renewable Energy (Electricity) Act 2000* (i.e. the Renewable Energy Target), 'except if the project is an emissions avoidance project that primarily involves the avoidance of methane emissions'.[15]

The exemption of landfill gas projects from these requirements means the main mechanism that is used to address additionality is the baseline in the net abatement amount calculation. The baseline is supposed to ensure that only additional abatement is credited. However, as noted above, it is designed exclusively to deal with regulatory additionality, not financial additionality. Further, projects that transitioned from Greenhouse Friendly to the CFI have no baseline, meaning they do not have any measures to deal with regulatory or financial additionality. From the publicly available data, it appears that around 13 projects fall into this category.

The exclusive focus on regulatory additionality in setting the baseline is defeasible for flaring-only projects where the only source of revenue for the project activity is ACCUs. For these projects, regulation is the primary reason site operators would capture and combust the gas without the incentive provided by the ERF. However, generation projects are in a different situation as they have three sources of revenue for the capture and combustion of the CH_4 component of the biogas:

(a) the sale of electricity;

(b) the sale of LGCs under the Renewable Energy Target; and

(c) the sale of ACCUs.

[14] *Carbon Credits (Carbon Farming Initiative — Landfill Gas) Methodology Determination 2015*, s 13(2).
[15] *Carbon Credits (Carbon Farming Initiative) Rule 2015*, s 21(2).

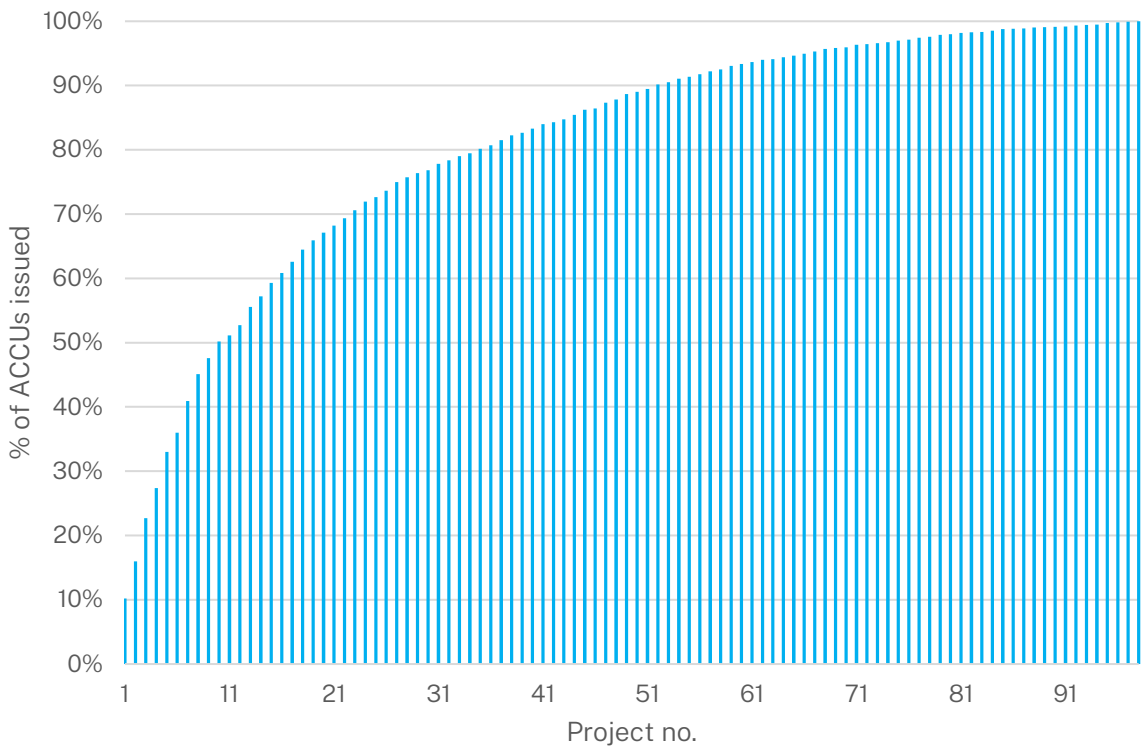
Given the project activity receives funding from two revenues sources other than ACCUs (electricity and LGCs), there are concerns that a significant proportion of the abatement would occur without the incentive provided by the ERF. These concerns are heightened, both by the fact 45% of the projects pre-date the CFI and the domination of the method by a relatively small number of large generation projects.

As Figure 1 illustrates, the top 20 largest projects account for almost 70% of all ACCUs issued under the method to date. The largest 30 projects account for almost 80% of the issued ACCUs. The concentrated nature of the credited abatements reflects the characteristics of Australia's solid waste disposal sector. Most of the country's solid waste goes to a small number of landfills located in or near the large metropolitan centres in eastern, southern and south-western Australia. Reflecting this, while there are 1,274 operating landfills in Australia, the 21 largest landfills receive 50% of the waste that is disposed to landfills.[16] There are only 48 landfills in Australia that receive more than 50,000 tonnes of waste per year, and only 60 that receive more than 25,000 tonnes.[17] The current trend is towards further consolidation and concentration of the sector.

Because these larger sites receive most of the waste, they also produce most of the CH_4 associated with solid waste disposal and have the greatest capacity to capture CH_4 and use it to generate electricity. Their size also allows these sites to benefit from the economies of scale that are associated with the operation of landfill gas facilities.

[16] Department of Industry, Science, Energy and Resources (2021) *National Inventory Report 2019: The Australian Government Submission to the United Nations Framework Convention on Climate Change*. Volume 2. Australian Government, Canberra, p 334.
[17] Department of Industry, Science, Energy and Resources (2021) *National Inventory Report 2019: The Australian Government Submission to the United Nations Framework Convention on Climate Change*. Volume 2. Australian Government, Canberra, p 334.

Figure 1. Proportion of ACCUs generated by project, largest to smallest, cumulative (reported projects only)*



Source: Clean Energy Regulator (2021) *Emissions Reduction Fund project register*, 19 December 2021. Available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register (20 February 2022).
* A number of landfill gas projects have more than one registration. This can be due to a number of issues, including the splitting of projects into separate parts for commercial reasons and the fact the method allows for upgrades to be registered as separate projects, even though all generation projects need to replace or substantially overall their generators on roughly 7-8 year cycles. Due to these issues, the following projects were treated as a single project for these purposes: Lucas Heights 2 and 2B; Woodlawn Energy Generation and Woodlawn Bioreactor; Swanbank and Swanbank Upgrade Projects; Mugga Lane and Mugga Lane Upgrade Projects; Pedler Creek and Pedler Creek Upgrade Projects; and Ti Tree Energy Generation and Ti Tree Gas to Energy Projects. Eastern Creek 1 and 2 were treated as separate projects because they have different project proponents and there was insufficient publicly available information to determine the reasons why there are two separate project listings.

The details of the 20 largest projects (based on average annual ACCU generation over the period 2019-2021) are provided in Table 1. As the data show, most of the projects formally transitioned from or were registered under the NSW GGAS (14 of the 20), all are located at major landfills (largest 10 landfills in the jurisdiction), and the majority (13 of the 20) have more than 3 megawatts of installed generation capacity. The fact these large sites have dominated the method should raises questions about the additionality of the credited abatement, especially given the absence of any measures in the method to address financial additionality.

Table 1. Largest ERF landfill gas projects, by average annual ACCU generation over the period 2019-2021

Project (area serviced)	Installed capacity (MW)	GGAS Registered	10 largest in state
Lucas Heights 2 (Sydney)*	17.25	GGAS Cat D	Y
MRL (Melbourne Regional Landfill) LFG Abatement Project (Melbourne)	9.20	GGAS Cat D	Y
Hallam Landfill Gas Project (Melbourne)	8.984	GGAS Cat D	Y
Rochedale Landfill Gas Project (Brisbane)	4.492	GGAS Cat D	Y
Wollert Landfill Gas Project (Melbourne)	6.738	GGAS Cat D	Y
Woodlawn Energy Generation Project (Tarago - Sydney)	7.455	GGAS Cat D	Y
Eastern Creek 2 (Sydney)	6.738	GGAS Cat D	Y
South Cardup Landfill Gas Project (Perth)	3.40		Y
Mugga Lane Landfill Gas Project (Canberra)	4.24	GGAS Cat D	Y
Wyndham Landfill Gas Project (Melbourne)	1.90	GGAS Cat D	Y
Pedler Creek – SRWRA Landfill (Adelaide)**	3.09	GGAS Cat A	Y
Ti Tree Energy Generation Project (Willowbank, Ipswich)	4.4	GGAS Cat D	Y
Swanbank Landfill Gas Project (Ipswich)	1.49	No	Y
Stapylton Landfill Gas Project (Gold Coast)	2.6	GGAS Cat D	Y
Rockingham Landfill Gas Abatement Facility (Perth)	2.67	No	Y
Kemps Creek project (Elizabeth Drive, Sydney)	2.80	No	Y
Newcastle Landfill Gas Project (Summerhill, Newcastle)	2.246	No	Y
Wyong Landfill Gas Project (Central Coast, NSW)	2.246	GGAS Cat D	Y
Horsley Park Landfill Gas Project (Sydney)	NDA	NDA	Y
Brooklyn Landfill Gas Project (Melbourne)	2.83	GGAS Cat D	Y

Source: Independent Pricing and Regulatory Tribunal (NSW) (2012) *Compliance and Operation of the NSW Greenhouse Gas Reduction Scheme during 2012*. NSW Government, Sydney; Australian Energy Market Operator (AEMO) (2022) *NEM Generation Information*, available at: https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/generation-information (20 February 2022); Department of the Environment, Water, Heritage and the Arts (2010) *National Waste Report 2010*. Commonwealth of Australia, Canberra.
NDA = no data available.
* There are two registered generators at Lucas Heights: Lucas Heights 1 (5.39 MW) and Lucas Heights 2 (17.25 MW). Both are owned by EDL LFG (NSW) Pty Ltd. The ERF Project Register includes two landfill gas projects (Lucas Heights 2 Landfill Gas Project and Lucas Heights 2B Landfill Gas Project). EDL LFG (NSW) Pty Ltd is the project proponent of both ERF projects. Due to their linkages, the two ERF projects have been combined for these purposes. However, Lucas Heights 1 has been treated as separate and not included in the above table.
** Under the NSW GGAS, Category A generating systems ceased being eligible to create NGACs on 30 June 2010. Due to this, they were not able to formally transition from the NSW GGAS to the CFI. However, they could be registered under the CFI through the *Carbon Credits (Carbon Farming Initiative) (Capture and Combustion of Methane in Landfill Gas from Legacy Waste: Upgrade Projects) Methodology Determination 2012*.

4. Emissions Reduction Assurance Committee reviews

In 2018, the Emissions Reduction Assurance Committee (ERAC) undertook a review to determine whether the crediting period for landfill gas projects should be extended (a 'crediting period extension review').[18] The review concluded that, in the absence of ACCUs, there would be insufficient incentive for flaring-only projects to continue to capture and flare the gas and that, as a consequence, the crediting period for flaring-only projects should be extended for 5 years. Acting on this recommendation, the original ERF method was subsequently amended to provide that flaring-only projects could have a crediting period of 12 years (the standard 7 years given to all emissions avoidance projects plus the additional 5 years recommended by the ERAC).[19]

In relation to generation projects, the review concluded that the crediting period should not be extended because:

> Extending the crediting period for electricity generation projects is likely to result in the issuance of ACCUs for emissions reductions that would occur in the ordinary course of events. For existing electricity generation projects, in most cases, the revenues from the sale of electricity and LGCs are likely to cover the ongoing capital, operational and maintenance costs of the projects, including engine refurbishment costs. Due to this, it is likely that, in most instances, existing electricity generation projects will continue in the absence of the incentive provided by the Emissions Reduction Fund (ERF). Similarly, the available evidence indicates the extension of the crediting period is unlikely to promote new electricity generation projects that would not have otherwise occurred.[20]

On this basis, the ERAC recommended that:

> … the crediting period for electricity generation projects should not be extended. Extending the crediting period for electricity generation projects carries too great a risk of crediting abatement that is likely to occur in the ordinary course of events.[21]

The ERAC's recommendation should have ensured the generation projects that were registered under the original ERF method received one, 7-year crediting period only. This is a product of section 114(7A) of the CFI Act, which provides that:

> The Minister must not vary a methodology determination so as to extend the crediting periods for the eligible offsets projects covered by the determination unless:
>
> (a) the Emissions Reduction Assurance Committee has advised the Minister under subsection 123A(2) or paragraph 255(hc) that the variation should be made; and

[18] Emissions Reduction Assurance Committee (2018) *Landfill Gas Method Crediting Period Review Report*. Commonwealth of Australia, Canberra.
[19] *Carbon Credits (Carbon Farming Initiative — Landfill Gas) Methodology Determination 2015*, s 13A.
[20] Emissions Reduction Assurance Committee (2018) *Landfill Gas Method Crediting Period Review Report*. Commonwealth of Australia, Canberra, p 3.
[21] Emissions Reduction Assurance Committee (2018) *Landfill Gas Method Crediting Period Review Report*. Commonwealth of Australia, Canberra, p 4.

(b) the Emissions Reduction Assurance Committee has not previously advised the Minister under subsection 123A(2) or paragraph 255(hc) that the variation should not be made; and

(c) the determination has not previously been varied so as to extend the crediting periods.

The effect of section 114(7A) is to make the ERAC's determination final. Once the ERAC has recommended that the crediting period of a method should not be extended, the Minister cannot vary the method to extend the crediting period, even if the ERAC subsequently changes its mind.

The ERAC's recommendation in the 2018 crediting period extension review report explains the new ERF generation-only method. After the original ERF method was amended to provide flaring-only projects with access to 12 year crediting periods, a decision was made to give generation projects the same extension. Because of the ERAC's recommendations in the 2018 crediting period extension review report, this could not be provided by way of an amendment to the original ERF method. The new ERF generation-only method was made as a way of getting around section 114(7A) of the CFI Act.

In its advice to the Minister on the new ERF generation-only method in July 2021, the ERAC claimed its decision to support the method was based on 'new analysis'. The ERAC's advice stated:

> In 2018, the Committee advised against extending the crediting period for landfill gas projects generating electricity. In 2019, the Committee agreed to review that decision based on new industry data. Further analysis of industry data in 2019 and 2020 and updated forecasts on electricity prices and large-scale generation certificate prices in 2021 indicated that extending the crediting period for landfill gas generation projects to 12 years would continue to produce abatement that would not ordinarily occur.[22]

And:

> At the April 2021 meeting the Committee agreed that a five-year crediting period extension for all electricity generation projects would likely result in additional abatement. This assessment was based on analysis and built on previous analysis by the Committee. It showed that after taking into account updated forecasts of lower electricity and large-scale generation certificate prices there was a projected decline in revenue from these projects. This analysis combined with no evidence that project costs have declined significantly supports the continued additionality of these projects over the extended crediting period.[23]

[22] Byers, D. (2021) *Letter to Hon Angus Taylor MP Minister for Energy and Emissions Reduction on the Carbon Credits (Carbon Farming Initiative — Electricity Generation from Landfill Gas) Methodology Determination 2021*. Commonwealth of Australia, Canberra. Available at: https://www.industry.gov.au/regulations-and-standards/methods-for-the-emissions-reduction-fund/landfill-gas-generation-method (16 March 2022).
[23] ERAC (2021) *Notice of advice to the Minister for the Energy and Emissions Reduction under section 123A(2) of the Carbon Credits (Carbon Farming Initiative) Act 2011 (the Act): Draft Carbon Credits (Carbon Farming Initiative — Electricity Generation from Landfill Gas) Methodology Determination 2021*. Commonwealth of Australia, Canberra. Available at: https://www.industry.gov.au/regulations-and-standards/methods-for-the-emissions-reduction-fund/landfill-gas-generation-method (16 March 2022).

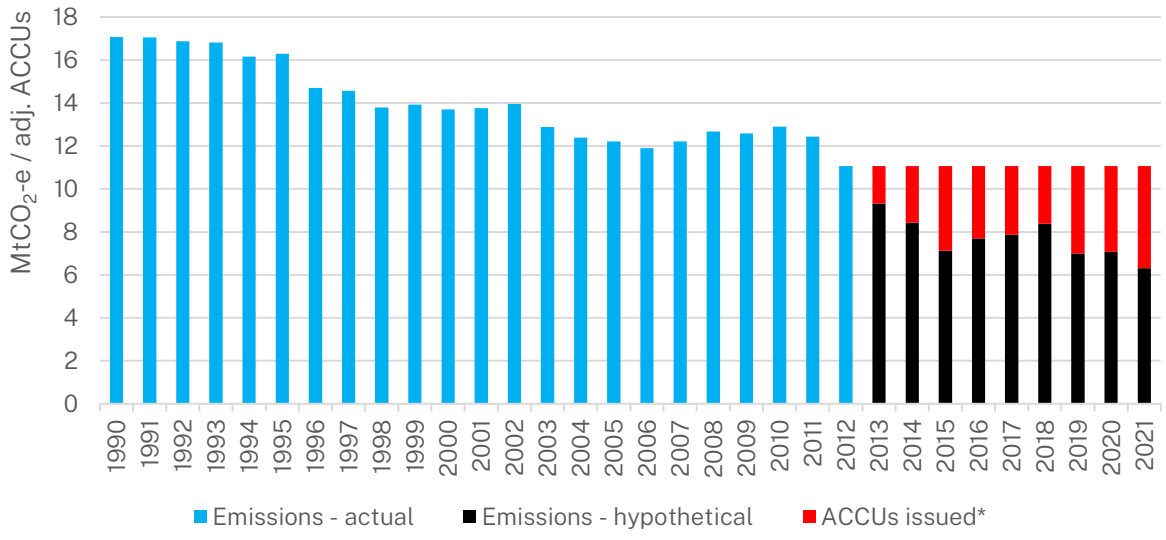
Despite its decision being based on this 'new analysis', the ERAC did not publish any information on it. Neither the analysis nor any information on its coverage of projects, price assumptions or how it was conducted has been released.

5. Looking back – the additionality of credited landfill gas abatement

In the absence of any information justifying the creation of the new ERF generation-only method, and the absence of measures to address financial additionality, this section looks at the extent to which the abatement that has been credited under the landfill gas methods to date is likely to have been additional.

Figure 2 below shows what could be expected to occur if the abatement credited under the landfill gas methods was 100% additional. Between 1990 and the end of 2011-12, landfill gas emissions declined as a consequence of a reduction in the amount of biodegradable material going to landfill and an increase in gas capture. If the abatement credited to registered ERF projects was fully additional, it is reasonable to expect that, from 2012-13 onwards (when the CFI landfill gas methods were first made), landfill gas emissions would decline in line with the number of credits that were issued, resulting in a roughly 3 million tonne reduction in CO_2-e emissions from landfills.[24]

Figure 2. Actual landfill gas emissions 1990-2012, hypothetical landfill gas emissions 2013-2021 and adjusted ACCU issuances 2013-2021 (financial years)*



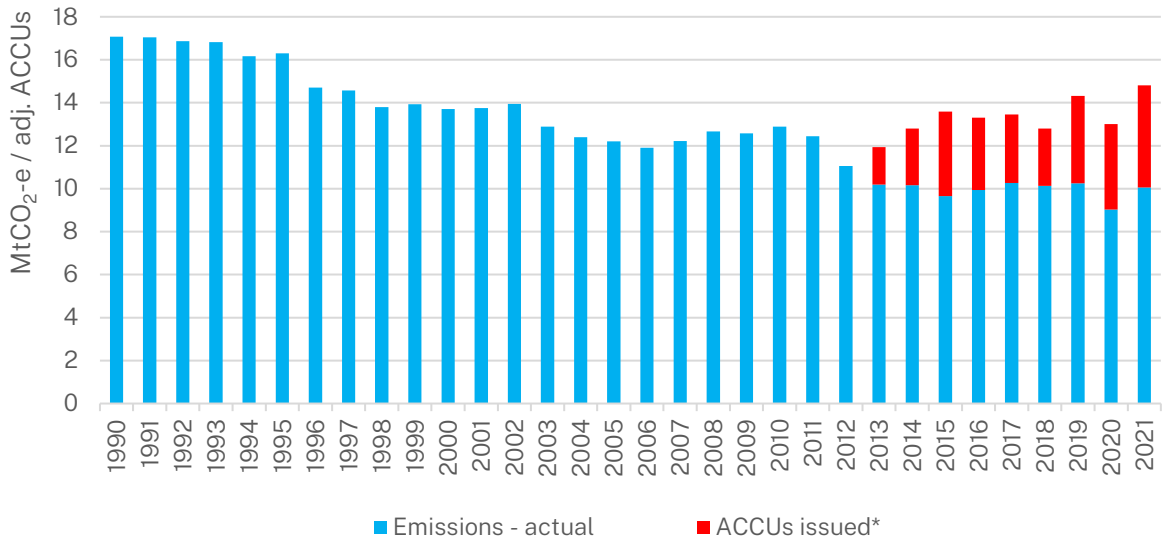
Source: Department of Industry, Science, Energy and Resources (2021) *National Inventory Report 2019: The Australian Government Submission to the United Nations Framework Convention on Climate Change*. Australian Government, Canberra; Clean Energy Regulator (2021) *Emissions Reduction Fund project register*, 19 December 2021. Available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register (20 February 2022).
* The ACCUs have been adjusted to account for the change in the 100-year global warming potential of CH_4 (from 25 to 28) that came into effect on 1 July 2020. This is to ensure the ACCUs are shown in equivalent units to the emissions.

[24] In Figure 2, the blue area shows actual landfill gas emissions to the end of 2011-12 and hypothetical emissions over the period 2013-2021. The hypothetical (what should have happened) emissions were calculated as emissions in 2011-12 less the ACCUs issued in the relevant year.

Figure 3 below shows what actually happened. The first CFI landfill gas methods were made in late 2012, and the original ERF method was made in January 2015. Potentially reflecting the registration of new projects, landfill gas emissions declined by approximately 0.86 Mt CO_2-e between 2012 and 2013. However, since then, landfill emissions have remained relatively stable, hovering around 10 Mt CO_2-e per year. On average over the period to the end of 2020-2021, landfill gas emissions were approximately 1.1 Mt CO_2-e lower than they were in 2011-12; the year before landfill gas projects were first registered under the CFI.

In contrast, on average, 3 million ACCUs per year were issued to landfill gas projects over the period 2012-13 to the end of 2020-21. Since the original ERF method commenced in 2015, an average of 3.3 million ACCUs were issued to these projects each year. In simple terms, 3.3 million ACCUs per year were issued to landfill gas projects yet emissions were only 1.1 Mt CO_2-e lower than they were before the projects were first registered under the CFI.

Figure 3. Actual landfill gas emissions 1990-2021 and adjusted ACCU issuances 2013-2021 (financial years)*

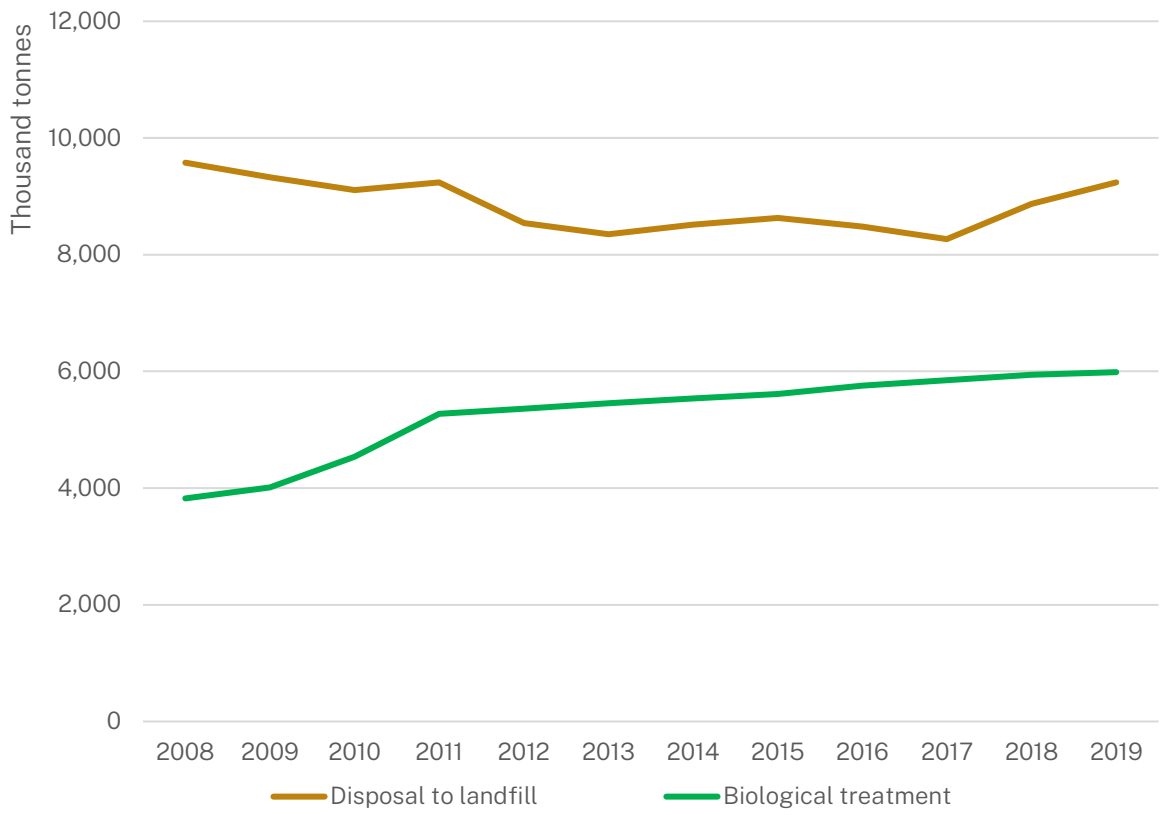


Source: Department of Industry, Science, Energy and Resources (2021) *National Inventory Report 2019: The Australian Government Submission to the United Nations Framework Convention on Climate Change*. Australian Government, Canberra; Clean Energy Regulator (2021) *Emissions Reduction Fund project register*, 19 December 2021. Available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register (20 February 2022).
* The ACCUs have been adjusted to account for the change in the 100-year global warming potential of CH_4 (from 25 to 28) that came into effect on 1 July 2020. This is to ensure the ACCUs are shown in equivalent units to the emissions.
Source:

For all or even the majority of ACCUs to represent real and additional abatement, the data suggest that landfill gas emissions would have to have increased by approximately 30% on 2012 levels if ACCUs were not provided to landfill gas projects. An obvious way this could have happened is if there was a marked increase in the amount of biodegradable material going to landfills. As Figure 4 shows, this did not occur. The quantity of biodegradable material disposed to landfill has been relatively stable since the 1990s, largely because of the increase in the diversion of this waste type to biological treatment processes.[25]

[25] Department of Industry, Science, Energy and Resources (2021) *National Inventory Report 2019: The Australian Government Submission to the United Nations Framework Convention on Climate Change*. Volume 2. Australian Government, Canberra. The National Waste Database 2020 shows a significant decline in

Figure 4. Biodegradable waste disposed to landfills vs waste biologically treated (financial years)

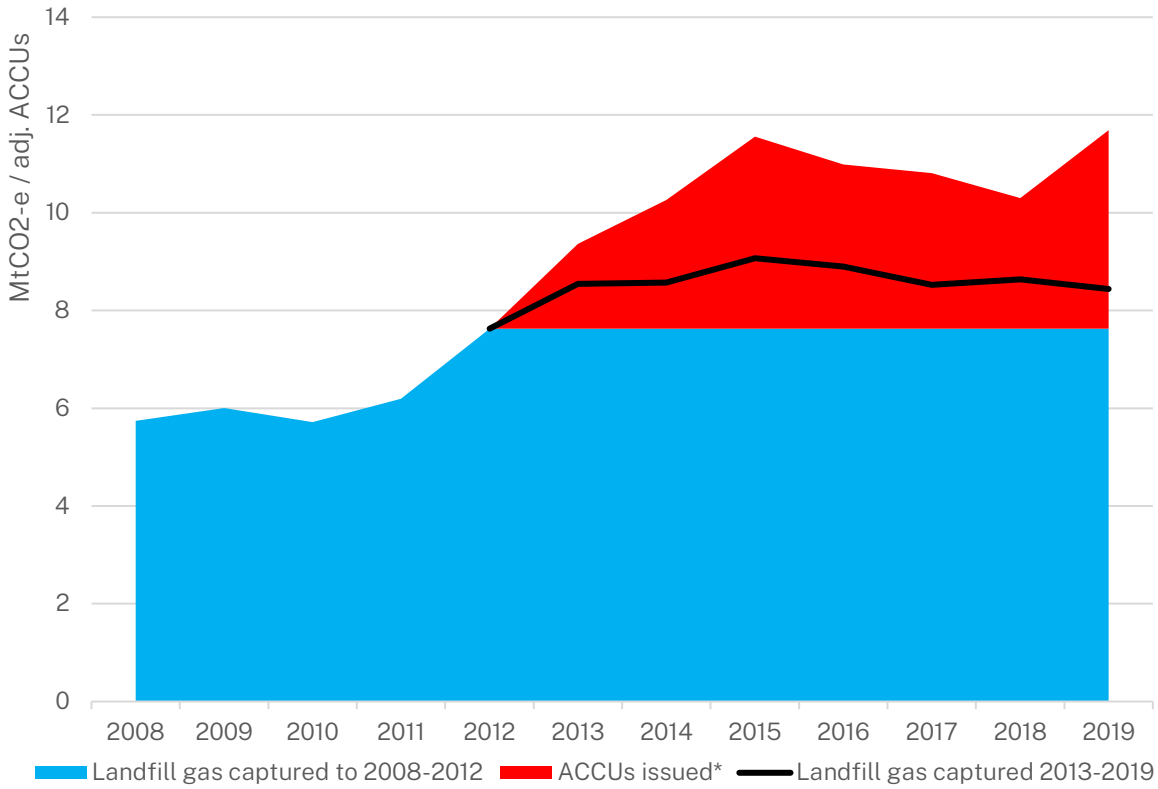


Source: Department of Industry, Science, Energy and Resources (2021) *National Inventory Report 2019: The Australian Government Submission to the United Nations Framework Convention on Climate Change*. Volume 2. Australian Government, Canberra.

Not surprisingly, the trends in landfill gas capture raise similar issues. The amount of CH_4 captured and combusted from landfills was, on average, 1 Mt CO_2-e higher over the period 2013-2019 than it was in 2011-12 (Figure 5). Yet the average number of ACCUs issued to landfill gas projects over this period was 2.75 million per year; or 3.1 million ACCUs per year over the period 2015 (when the ERF commenced) to 2019.

biodegradable waste deposited to landfill over this period. The more conservative figures from the National Inventory Report were used to avoid the perception of preferential data selection. Nyunt, P., Donovan, S. (2020) *National Waste Database 2020*. Prepared for the Department of Agriculture, Water and the Environment. Blue Environment Pty Ltd, Melbourne, available at: https://www.awe.gov.au/environment/protection/waste/national-waste-reports/2020 (20 February 2022).

Figure 5. CH_4 captured at landfills vs adjusted ACCU issuances (financial years)*

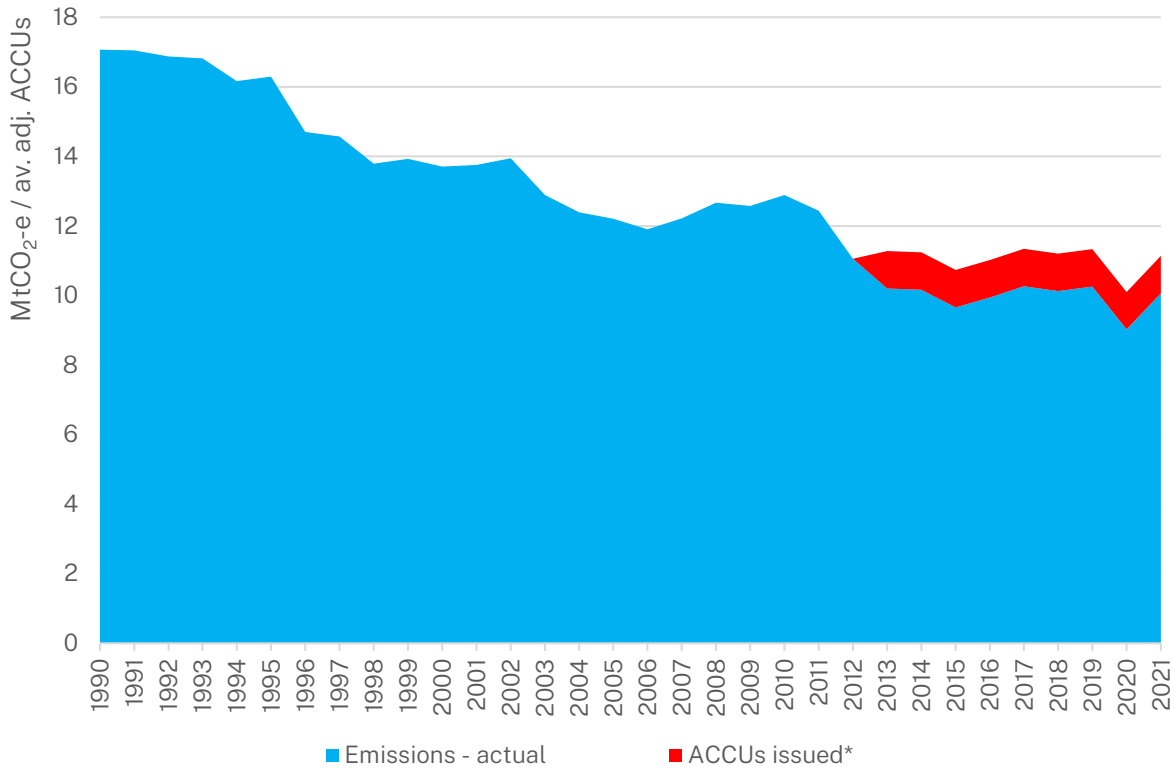


Source: Department of Industry, Science, Energy and Resources (2021) *National Inventory Report 2019: The Australian Government Submission to the United Nations Framework Convention on Climate Change*. Volume 2. Australian Government, Canberra; Clean Energy Regulator (2021) *Emissions Reduction Fund project register*, 19 December 2021. Available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register (20 February 2022).
* The ACCUs have been adjusted to account for the change in the 100-year global warming potential of CH_4 (from 25 to 28) that came into effect on 1 July 2020. This is to ensure the ACCUs are shown in equivalent units to the emissions.

The published data on the trends in landfill CH_4 emissions, CH_4 capture and ACCU issuances raise significant questions about the extent to which the abatement credited under the landfill gas methods has been additional. A simple before-and-after comparison suggests that possibly as few as 1 in 3 of the ACCUs issued to landfill gas projects to date reflect abatement that would not have otherwise occurred.

This ratio points to the fact that the method's additionality issues are most likely associated with the larger projects, particularly the largest 20 projects that account for almost 70% of the issued ACCUs. As Figure 6 shows, if the ACCUs issued to the 20 largest projects are excluded, the average adjusted number of ACCUs issued to landfill gas projects (1.1 million) matches almost exactly the average reduction in emissions off 2011-12 levels (1.1 $MtCO_2$-e).

Figure 6. Actual landfill gas emissions 1990-2021 and average adjusted ACCU issuances 2013-2021, excluding the largest 20 landfill gas projects (financial years)*



Source: Department of Industry, Science, Energy and Resources (2021) *National Inventory Report 2019: The Australian Government Submission to the United Nations Framework Convention on Climate Change*. Volume 2. Australian Government, Canberra; Clean Energy Regulator (2021) *Emissions Reduction Fund project register*, 19 December 2021. Available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register (20 February 2022).
* The ACCUs have been adjusted to account for the change in the 100-year global warming potential of CH_4 (from 25 to 28) that came into effect on 1 July 2020. This is to ensure the ACCUs are shown in equivalent units to the emissions.

The only possible counter argument that could be made in support of the additionality of landfill gas ACCUs is that there were financial pressures that meant there would have been a marked decline in the capture and combustion of CH_4 at the large landfills if the ACCUs were not provided. That is, without ACCUs, the large landfills would have reduced their capture and combustion rates to levels at or near the default proportion or their site-specific regulatory proportion because the revenues from the sale of electricity and LGCs would not have been sufficient to make it financial viable to maintain their previous operations.

The plausibility of this argument can be tested by looking at the trends in inflation adjusted (real) electricity, LGC and NSW Greenhouse Abatement Certificates (NGAC, offset certificates issued under the NSW GGAS) prices since the early 2000s to determine whether there was a material difference in the prevailing market conditions over the period 2013-2021 relative to the pre-2013 era. As shown in Table 2, of the 20 largest projects, 15 were established and operational prior to 2011, when the CFI Act commenced. Only two are known to have commenced since then, with the commencement dates of a further two unknown. Of the 16 that commenced prior to 2011, 14 were registered under the NSW GGAS and received NGACs. If the prices landfill gas operators received for the generation of electricity and LGCs (after accounting for NGACs and inflation) declined significantly over the period 2013-2021 relative to the pre-2013 era, it

would be consistent with the notion that the larger projects may have scaled back their capture rates if they were not given ACCUs. Equally, if there has been no material change in real electricity and LGCs prices (after accounting for NGACs), or real prices have increased, it provides further support for the notion that the credits issued to these projects are unlikely to represent additional abatement.

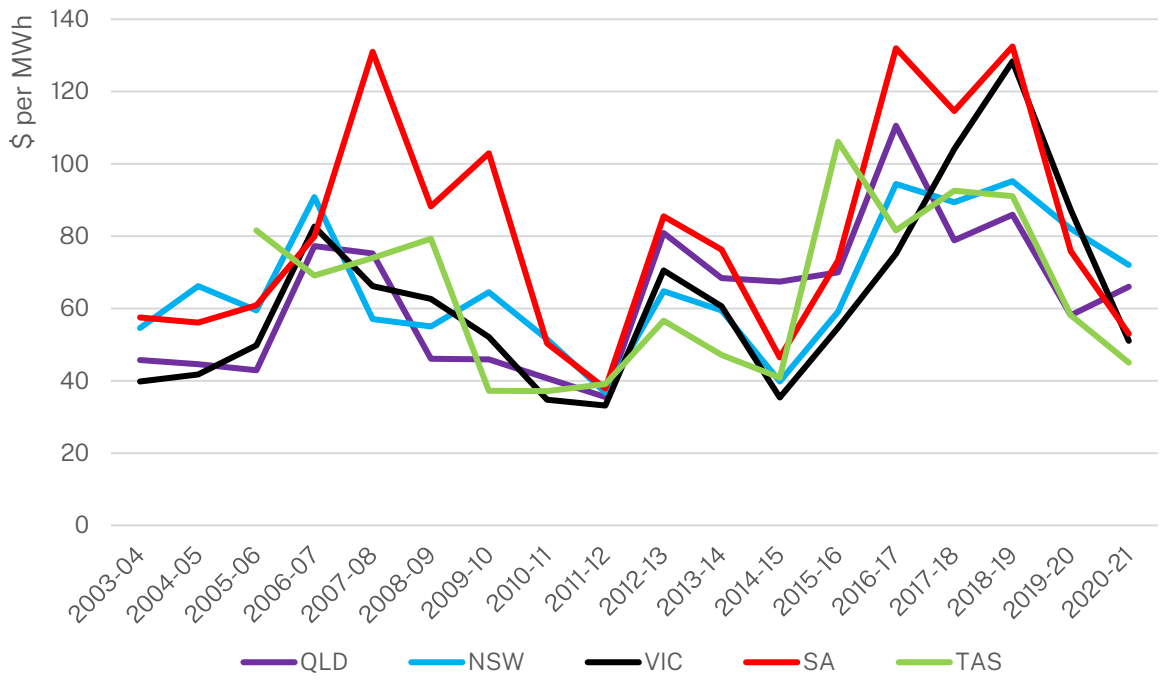
Table 2. 20 largest ERF landfill gas projects, commencement year

Year	Pre-2005	2006-2011	2012-2015	Post 2015	Unknown
No. of projects	8	7	2	1	2

Source: Independent Pricing and Regulatory Tribunal (NSW) (2012) *Compliance and Operation of the NSW Greenhouse Gas Reduction Scheme during 2012*. NSW Government, Sydney; Clean Energy Regulator (2021) *Emissions Reduction Fund project register*, 19 December 2021. Available at: http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register (20 February 2022).

As shown in Figure 7, electricity prices in the National Electricity Market (NEM) did not decline significantly over the period 2013-2021 relative to the pre-2013 era. For most of the ERF period to date, real volume weighted prices were above those that prevailed over the period 2003-04 to 2011-12. There was a spike in real prices over the period 2016-17 to 2018-19, so much so that federal and state governments sought to intervene in the National Electricity Market to put downward pressure on wholesale and retail prices. Real prices then fell in 2019-20 and 2020-21 to levels more consistent with those seen in the 2000s and early 2010s.

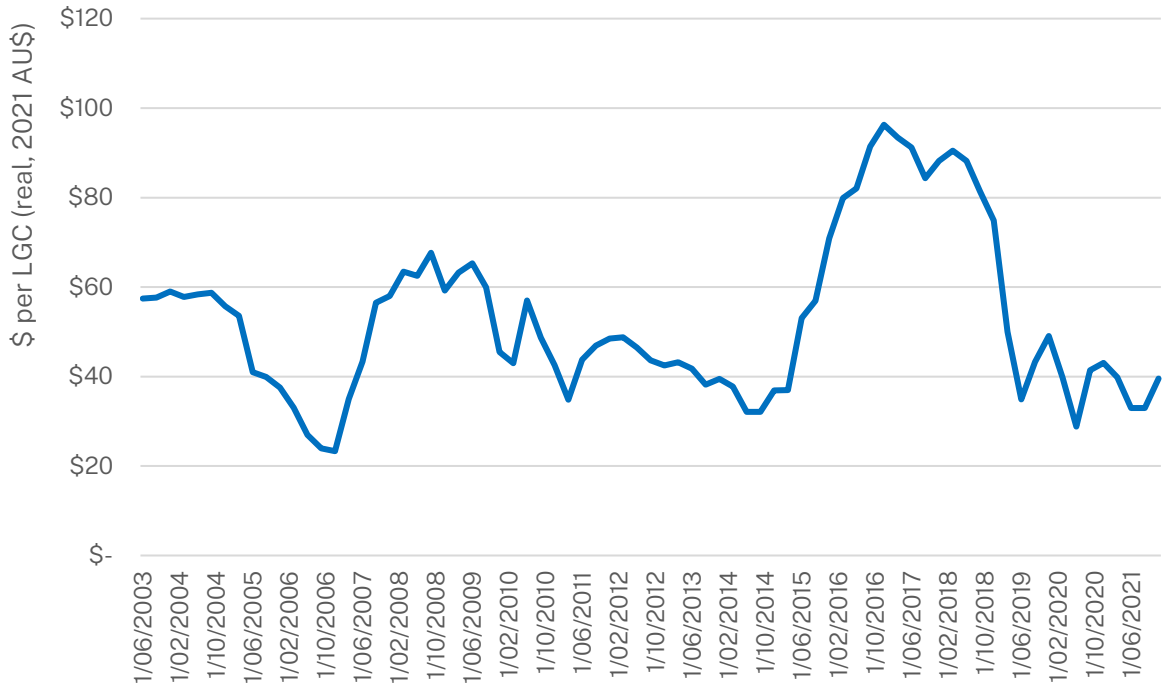
Figure 7. Real annual volume weighted average 30-minute electricity prices, by NEM region (2021 AU$)



Source: Australian Energy Regulator (AER) (2022) *Annual volume weighted average 30-minute prices – regions*. Available at: https://www.aer.gov.au/wholesale-markets/wholesale-statistics/annual-volume-weighted-average-30-minute-prices-regions (20 February 2022); Australian Bureau of Statistics (ABS) (2022) *Consumer Price Index, Australia*. Available at: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/dec-2021 (20 February 2022).

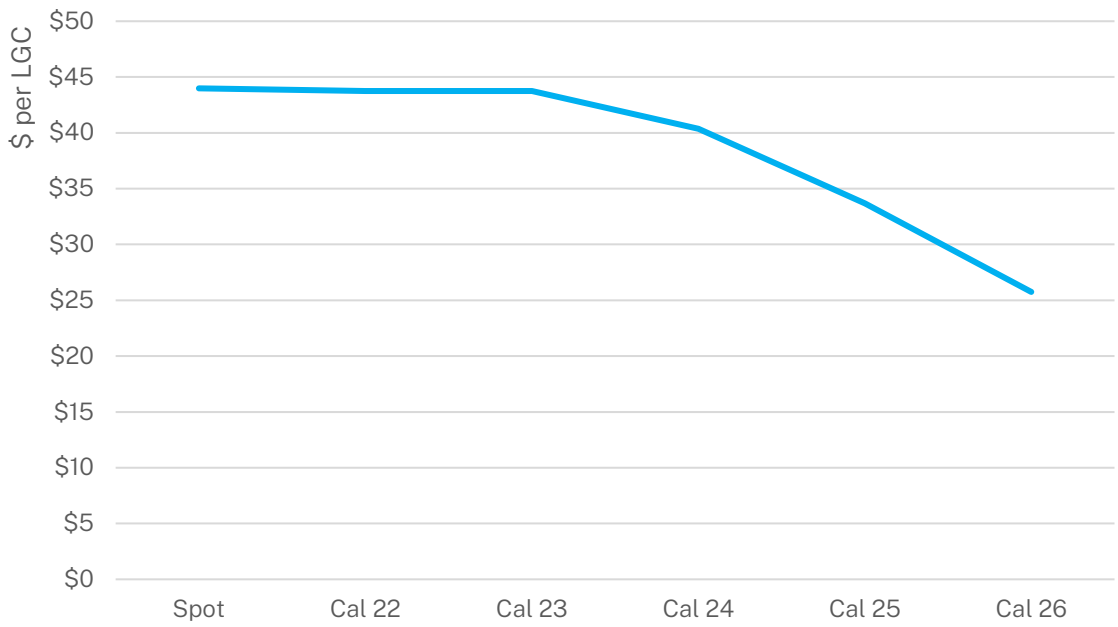
The trends in real LGC prices have been similar (Figure 8). They were relatively stable from 2004 to 2015, with real LGC (or REC) prices fluctuating between $30-$60 per LGC (1 LGC =1 megawatt hour (MWh) of generated electricity from eligible renewable generators). They then increased significantly over the period 2015 to the end of 2018, before falling back to around $40 per LGC over the period 2019 to the end of 2021. While there was conjecture that LGC prices might fall rapidly after 2020, this has not occurred and both spot and forward prices of LGCs remain relatively strong. LGC prices have been above $40 per LGC since late 2021 and, at the time of writing, mid-point forward prices were above $30 per LGC out to 2025, falling to $25-$26 in 2026 (Figure 9).

Figure 8. Real LGC prices, quarterly closing price, 30 June 2003 to December 2021 (2021 AU$)



Source: Green Energy Markets (11 February 2022); Australian Bureau of Statistics (ABS) (2022) *Consumer Price Index, Australia*. Available at: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/dec-2021 (20 February 2022).

Figure 9. LGC forward prices, calendar year, mid-point index, as at February-March 2022



Source: Mercari (2022) 'LGC Closing Rates'. Available at: http://lgc.mercari.com.au/ (16 March 2022); Green Energy Markets (18 February 2022).

The NSW GGAS was the world's first mandatory greenhouse gas emissions trading scheme. It commenced on 1 January 2003 (and in the Australian Capital Territory on 1 January 2005) and operated until 1 July 2012, when it was closed to make way for the Australian Government's carbon pricing scheme. Under the NSW GGAS, abatement certificate providers could be accredited to carry out greenhouse gas abatement projects and be issued with NGACs that were tradable and could be used by 'benchmark participants' (who were predominantly electricity retailers) to meet their benchmark obligations.[26] The abatement could be produced through activities that reduce the emissions intensity of electricity generation and/or avoid methane emissions (under the Generation Rule), activities that reduce electricity consumption (under the Demand Side Abatement Rule), and activities that sequester carbon in planted forests (under the Carbon Sequestration Rule). Where the abatement certificate providers involved electricity generation, they could be outside of NSW, provided they exported electricity into the main transmission systems of the National Electricity Market, or to distribution systems connected to those systems in NSW, the Australian Capital Territory, Queensland, Victoria, South Australia, and, once Basslink was completed, Tasmania.

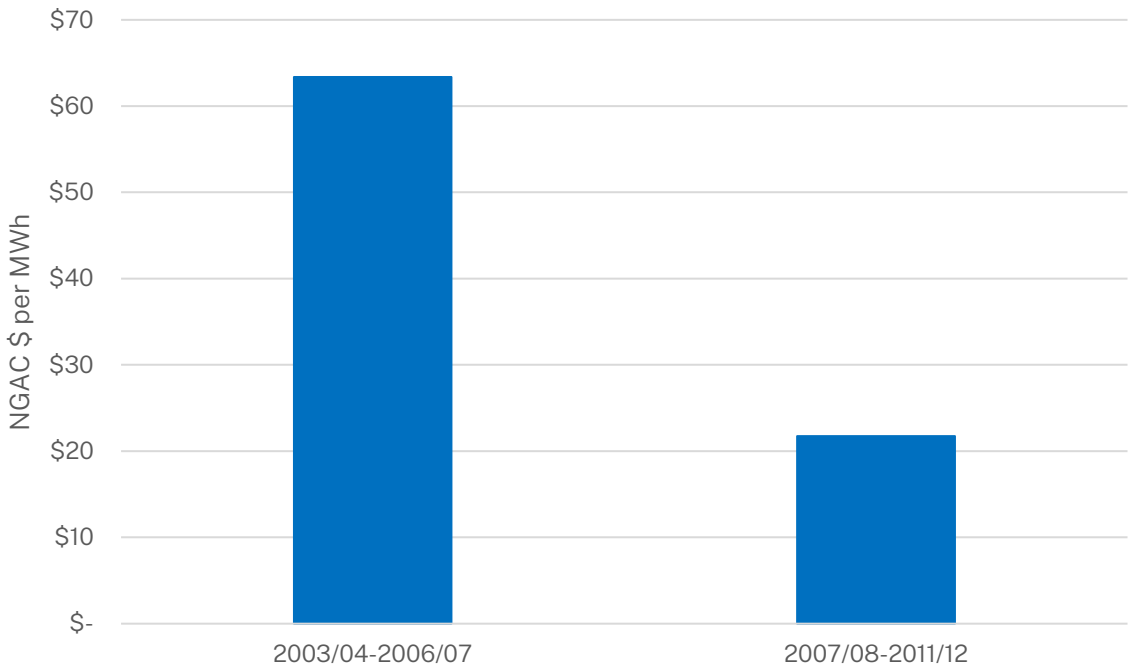
Landfill gas projects played a significant role in the NSW GGAS, receiving 23% of the NGACs registered under the Generation Rule and 16% of the total number of credits registered over the life of the scheme.[27] The registered landfill gas projects came from across all of the eligible jurisdictions: New South Wales, Queensland, Victoria, South Australia and Tasmania. Five of the ERF's 20 largest landfill gas projects that were registered under the NSW GGAS were first commissioned before the NSW GGAS scheme commenced: Lucas Heights 2 (1998); Mugga Lane (2000); Pedler Creek (1995); Stapylton (2002); and Brooklyn (2001). A further nine of the largest

[26] The scheme also provided for the issuance of non-tradable Large User Abatement Certificates (LUACs) to elective benchmark participants. These are not relevant in this context.
[27] Independent Pricing and Regulatory Tribunal (NSW) (2012) *Compliance and Operation of the NSW Greenhouse Gas Reduction Scheme during 2012*. NSW Government, Sydney.

20 ERF projects were registered under the NSW GGAS and were commissioned while it was in operation.

Nominal NGAC prices fluctuated in the range $7.50-$15.00 per NGAC from the commencement of the NSW GGAS in 2003 through to late 2007, before falling in response to the prospect of the introduction of a national carbon pricing scheme.[28] Between late 2007 and mid-2011, NGAC prices stabilised around $5 per NGAC, with a period of low prices around $2.50 per NGAC in late 2008 and early 2009. As it became clear the Australian Government would introduce the carbon pricing mechanism, NGAC prices plunged below $2 per NGAC and remained there until scheme closure in mid-2012. These price trends can be divided into two broad periods: the 2003/04-2006/07 period; and the 2007/08-2011/12 period. As shown in Figure 10, during the 2003/04-2006/07 period, the average NGAC price equated to around $63 per MWh in inflation adjusted terms. In the 2007/08-2011/12 era, the average real price was the equivalent of approximately $22 per MWh.

Figure 10. Average real NGAC prices, 2003/04-2006/07 and 2007/08-2011/12 periods, in $ MWh (2021 AU$)



Source: Independent Pricing and Regulatory Tribunal (NSW) (2012) *Compliance and Operation of the NSW Greenhouse Gas Reduction Scheme during 2012*. NSW Government, Sydney; Australian Bureau of Statistics (ABS) (2022) *Consumer Price Index, Australia*. Available at: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/dec-2021 (20 February 2022).

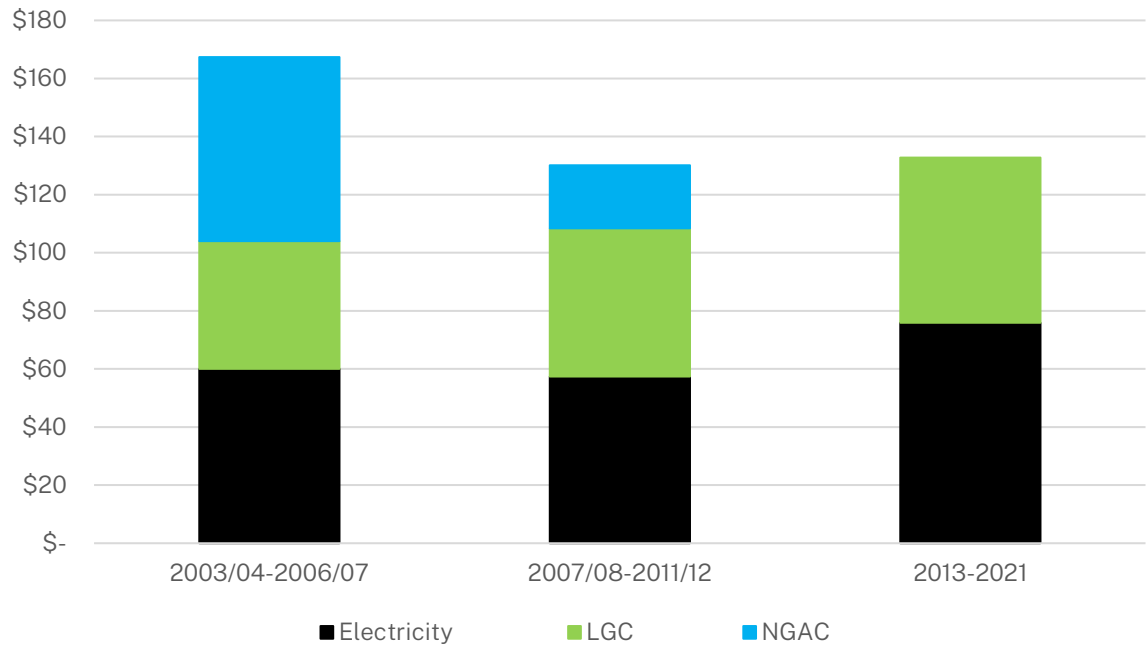
The data suggest the combined average real electricity, LGC and NGAC prices faced by the large ERF projects were at their highest during the 2003/04-2006-07 era, but were similar during the 2007/08-2011/12 and 2012-13 to 2020/21 periods (Figure 11).[29] Over the four years

[28] Independent Pricing and Regulatory Tribunal (NSW) (2012) *Compliance and Operation of the NSW Greenhouse Gas Reduction Scheme during 2012*. NSW Government, Sydney.

[29] NGAC prices were converted to $ MWh using a price to MWh multiplier of 3.89, based on a 100-year GWP for CH_4 of 21, the factor for converting CH_4 m^3 at standard conditions to tCO_2-e from the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*, the energy content factor for CH_4

between 2003/04 and 2006-07, the combined average price was around $167 per MWh. This fell to $130 per MWh in the five year 2007/08-2011/12 period. In contrast, the average combined real electricity and LGC price since the CFI/ERF commenced was $133 per MWh.

Figure 11. Average real electricity, LGC and NGAC prices, 2003/04-2006/07, 2007/08-2011/12 and 2013-2020 periods, in $ MWh (2021 AU$)



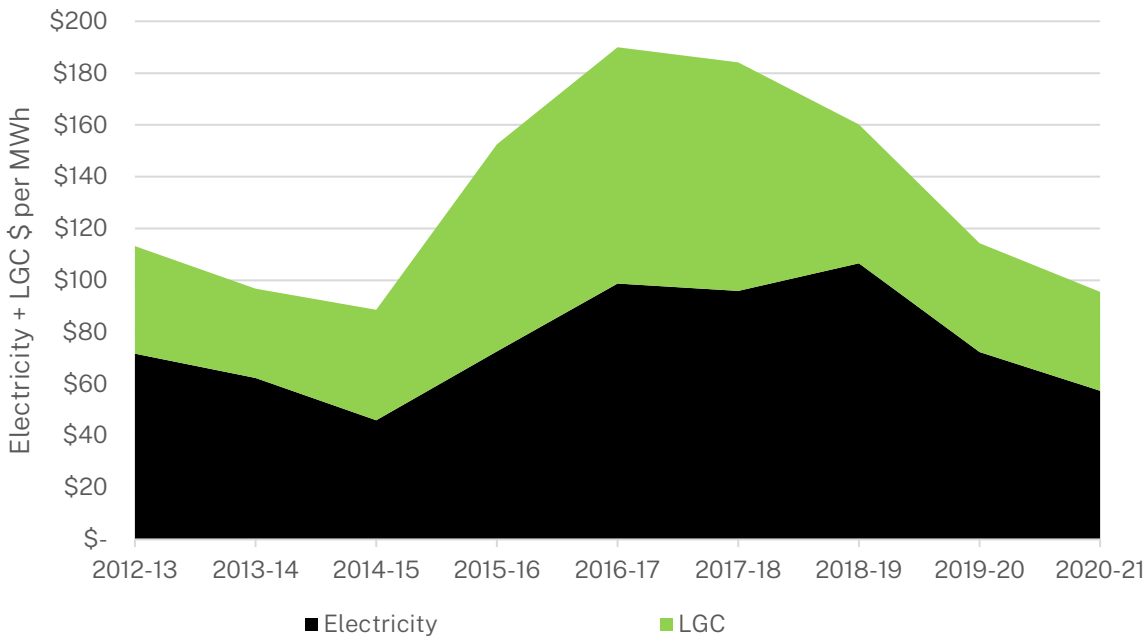
Source: Australian Energy Regulator (AER) (2022) *Annual volume weighted average 30-minute prices – regions*. Available at: https://www.aer.gov.au/wholesale-markets/wholesale-statistics/annual-volume-weighted-average-30-minute-prices-regions (20 February 2022); Green Energy Markets (11 February 2022); Independent Pricing and Regulatory Tribunal (NSW) (2012) *Compliance and Operation of the NSW Greenhouse Gas Reduction Scheme during 2012*. NSW Government, Sydney; Australian Bureau of Statistics (ABS) (2022) *Consumer Price Index, Australia*. Available at: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/dec-2021 (20 February 2022).

These data suggest ACCUs are unlikely to have been necessary to ensure large landfill gas operations maintained their capture and combustion rates over the post 2012 era. Notably, the average combined real prices were comparable across the 2007/08-2011/12 and 2012-13 to 2020/21 eras. Moreover, the combined real electricity and LGC price exceeded $110 per MWh for most of the post 2012 era (6 out of the 9 years), significantly above what is likely to be necessary to ensure the profitability of the larger sites (Figure 12).

Since 2020, the combined electricity and LGC price has been more subdued but still in a range where the largest projects that account for the bulk of the ACCUs should still have been profitable. For the counterargument to be true, the financial viability of these large sites would need to be put at risk by a combined electricity and LGC price below $90-$100 per MWh. Given that many large landfill gas projects operate in Australia and elsewhere at prices below this level, this argument is difficult to believe.

from landfills from the *National Greenhouse Account Factors 2021*, and an assumed electrical conversion efficiency of 35%.

Figure 12. Combined real average electricity (NEM) and LGC price, 2012-13 to 2020-21 (2021 AU$)

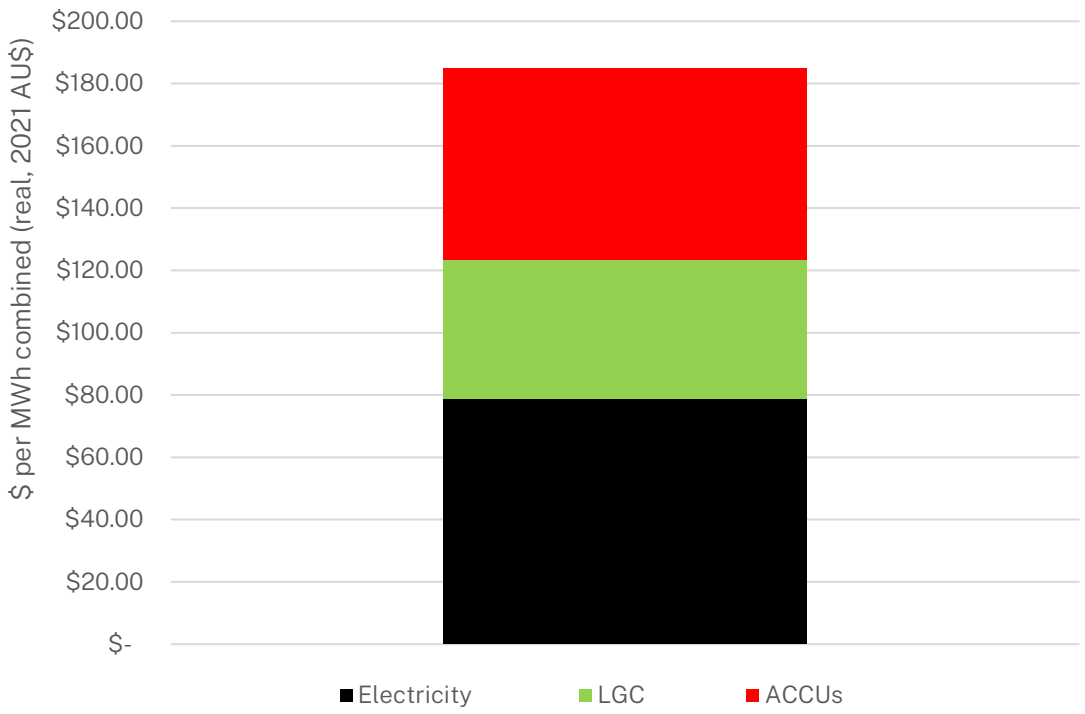


Source: Australian Energy Regulator (AER) (2022) *Annual volume weighted average 30-minute prices – regions*. Available at: https://www.aer.gov.au/wholesale-markets/wholesale-statistics/annual-volume-weighted-average-30-minute-prices-regions (20 February 2022); Green Energy Markets (11 February 2022); Australian Bureau of Statistics (ABS) (2022) *Consumer Price Index, Australia*. Available at: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/dec-2021 (20 February 2022).

The implausibility of the argument that ACCUs were likely to be necessary to ensure the largest landfill gas projects did not reduce their capture and combustion rates is further highlighted by Figure 13. The graph shows the combined real average electricity and LGC price for the three-year period 2018 to 2020, and the average real effective ACCU price in MWh for 16 of the largest 20 projects (using an assumed ACCU price of $16).[30] Again, it is hard to imagine that these projects would have needed an effective subsidy of ~$60 per MWh (in inflation adjusted terms) to remain viable and maintain their capture rates over this period, when the real average combined electricity and LGC price was around $120 per MWh.

[30] The 16 sites were selected because they are 'designated generation facilities' under the *National Greenhouse and Energy Reporting Act 2007*, meaning there is publicly available information on their electricity production. Electricity production was converted to ACCUs using a 100-year GWP for CH_4 of 28, the factor for converting CH_4 m^3 at standard conditions to tCO_2-e from the *National Greenhouse and Energy Reporting (Measurement) Determination 2008*, the energy content factor for CH_4 from landfills from the *National Greenhouse Account Factors 2021*, an assumed electrical conversion efficiency of 35% and individualised baselines based on whether the site was registered under the NSW GGAS (24% for NSW GGAS projects and 30% for other projects). The results were cross checked by multiplying the ACCUs received over this period (from the ERF Project Register) by $16, and dividing the result by the reported generation. When two outliners were removed, the results were similar (average $50.48 per MWh vs $61.46 per MWh). The former method was preferred because there can be significant mismatches between the ACCUs issued in a year and the associated generation as a consequence of the timing when proponents report for the purposes of the ERF. Clean Energy Regulator (2021) 'Electricity sector emissions and generation data'. Available at: http://www.cleanenergyregulator.gov.au/NGER/National%20greenhouse%20and%20energy%20reporting%20data/electricity-sector-emissions-and-generation-data (20 February 2022).

Figure 13. Real average electricity and LGC price (2018 to 2020), and the average effective ACCU price in MWh for 16 of the largest 20 landfill gas projects (2021 AU$)



Source: Australian Energy Regulator (AER) (2022) *Annual volume weighted average 30-minute prices – regions*. Available at: https://www.aer.gov.au/wholesale-markets/wholesale-statistics/annual-volume-weighted-average-30-minute-prices-regions (20 February 2022); Green Energy Markets (11 February 2022); Australian Bureau of Statistics (ABS) (2022) *Consumer Price Index, Australia*. Available at: https://www.abs.gov.au/statistics/economy/price-indexes-and-inflation/consumer-price-index-australia/dec-2021 (20 February 2022).

It must be stressed that the larger landfill gas projects are likely to sell a substantial proportion of their electricity and LGCs under power purchase agreements that do not necessarily reflect the prices available in spot markets. However, even accounting for this, the conditions in the electricity and LGC markets over the period 2013 to 2021 do not support the hypothesis that the financial viability of the larger landfill gas projects was likely to be dependent on accessing ACCUs.

6. Looking forward – evidence to support the new method?

As noted in the introduction, all ERF methods are supposed to meet the statutory offset integrity standards. Most relevantly, these standards require the methods to result in additional carbon abatement and to be supported by 'clear and convincing evidence', and for all of their estimates, projections and assumptions to be conservative.

For the new generation-only method to satisfy the offsets integrity standards, there would need to be compelling evidence that the abatement credited under the method would not occur in the absence of the incentive provided by the issuance of ACCUs. The need for compelling evidence is dictated by the requirements of the offsets integrity standards that methods be conservative and be supported by clear and convincing evidence. The focus on the large generation projects

is necessitated by the fact they account for most (~70%) of the abatement that is likely to be credited under the method for the foreseeable future.

To satisfy this test, two things would need to be demonstrated:

a) that large generation projects need ACCUs to continue operating – i.e. they are likely to shut down or substantially reduce their biogas capture and combustion rates if they do not continue to receive ACCUs for a further 5 years; and

b) that the baselines are appropriately calibrated to account for the regulatory and market factors that incentivise the activity if ACCUs are not provided.

The available information supports the following statements.

- There are material financial incentives for generation projects to operate, even without ACCUs, because they can receive revenue from the sale of both electricity and LGCs.

- Like the original ERF method, the new generation-only method contains no measures to mitigate the risks associated with financial additionality.

- In relation to regulatory addiitionality, the new generation-only method allows all of the large generation projects to continue to use the baselines they have been using to date. Hence, projects that transitioned from the NSW GGAS scheme will be able to continue to use a baseline gas capture rate of 24%, while those that transitioned from the Greenhouse Friendly scheme will have a 0% baseline gas capture rate. This is despite the fact that, in its periodic review of the original ERF method 2019, the ERAC found that:

  > Maintaining a 30 per cent default gas capture rate is appropriate and conservative, as it means the method does not credit emissions reductions that may be required to occur in each state and territory. … The method should continue to apply the default regulatory gas capture rate [30%] **as a minimum** where state or territory industry guidelines are in place to ensure credited abatement remains conservative.[31] [Emphasis added]

- In 2018, the ERAC found that generation projects are likely to continue in the absence of the incentive provided by the ERF and that extending the crediting period for generation projects was not likely to lead to the registration of new projects.[32]

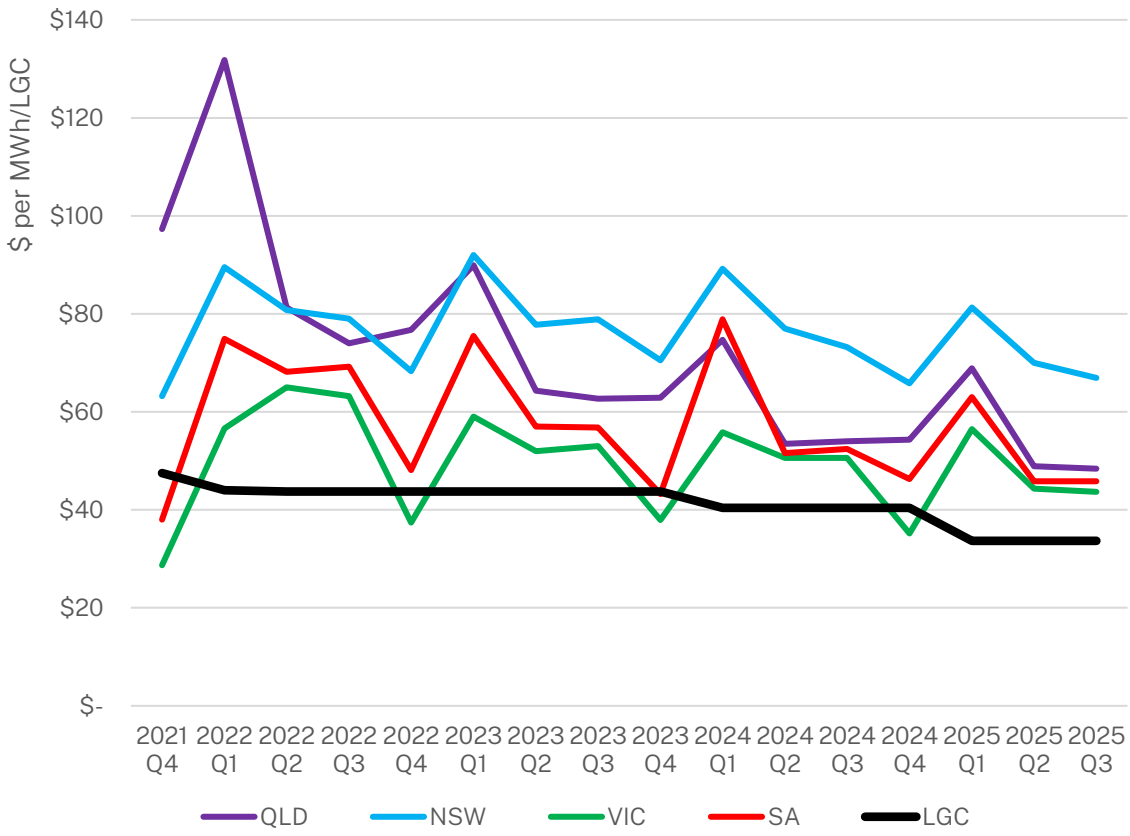
- The trends in landfill gas emissions, and the capture and combustion of CH_4 from landfills, are difficult to reconcile with the number of ACCUs issued to registered projects. However, if the largest 20 projects are excluded from the analysis, the trends in CH_4 emissions align neatly with the number of ACCUs issued to the remaining projects.

[31] Emissions Reduction Assurance Committee (2019) *Review of the Landfill Gas Method*. Commonwealth of Australia, Canberra.
[32] Emissions Reduction Assurance Committee (2018) *Landfill Gas Method Crediting Period Review Report*. Commonwealth of Australia, Canberra.

- The conditions in the electricity and LGC markets since 2013 do not support the hypothesis that the financial viability of the larger landfill gas projects was likely to be dependent on accessing ACCUs.

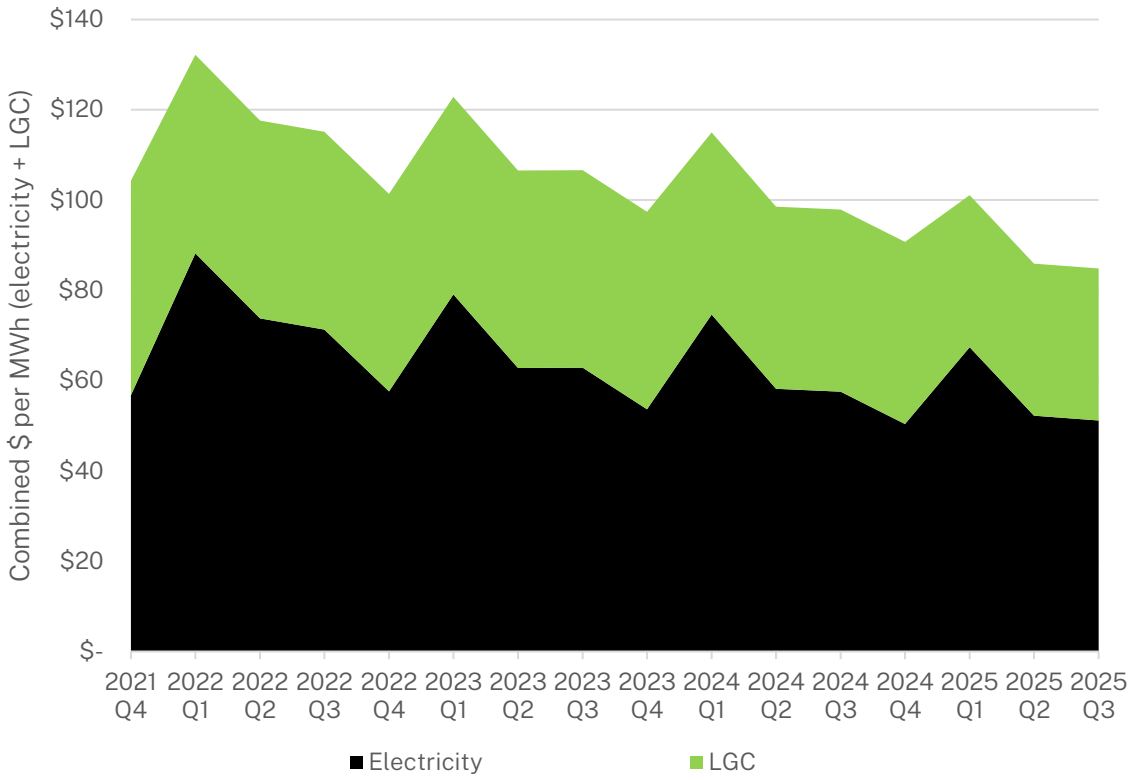
- The available data suggest electricity and LGC prices are likely to remain in a range that is sufficient to ensure the continued profitability of the larger generation projects that account for the majority of the ACCUs until at least 2025. This is illustrated in Figures 14 and 15, which show the futures prices for electricity (NEM only) and LGCs out to 2025, as of February-March 2021.

Figure 14. Futures prices for electricity and LGCs, 2021 to 2025



Source: Australian Energy Regulator (2021) *Quarterly base futures prices and volume traded*. AER Reference 11048184. Available at: https://www.aer.gov.au/wholesale-markets/wholesale-statistics/quarterly-base-futures-prices-and-volume-traded (19 February 2022); Mercari (2022) 'LGC Closing Rates'. Available at: http://lgc.mercari.com.au/ (16 March 2022); Green Energy Markets (18 February 2022).

Figure 15. Combined average futures prices for electricity and LGCs, 2021 to 2025



Source: Australian Energy Regulator (2021) 'Quarterly base futures prices and volume traded'. AER Reference 11048184. Available at: https://www.aer.gov.au/wholesale-markets/wholesale-statistics/quarterly-base-futures-prices-and-volume-traded (19 February 2022); Mercari (2022) 'LGC Closing Rates'. Available at: http://lgc.mercari.com.au/ (16 March 2022); Green Energy Markets (18 February 2022).

Given the available data, it does not seem to be possible that the ERAC could reasonably conclude that there is compelling evidence that the large generation projects are likely to shut down or substantially reduce their biogas capture and combustion rates if they do not continue to receive ACCUs for a further 5 years. It seems inevitable that the new generation-only method will result in the large projects being substantially over-credited for a further 5 years, meaning most of the credited abatement under the method is likely to be non-additional.

Due to its manifest integrity deficiencies, the new generation-only method should be revoked. Preferably, a new method would then be prepared that increases the baselines of the larger projects to account for regulatory and financial additionality. This should involve the use of a tiered baseline system, where projects receive different baseline capture rates that account for the economies of scale associated with their operation. Under this approach, the smallest projects would have baselines in the range 0-10% and the baselines would progressively increase depending on the amount of biodegradable waste landfills receive (tonnes of biodegradable waste) and the installed capacity of the generators onsite (i.e. the higher of the two). The largest landfills would have baselines of at least 75-80%. Adopting this approach would ensure the method contains an appropriate mechanism to address regulatory *and* financial additionality risks, while continuing to incentivise investment in the maximisation of CH_4 capture and combustion. The baseline tiers could then be reviewed and revised on 5-yearly cycles to ensure they reflect prevailing market conditions, similar to what occurs with infrastructure assets that are subject to price regulation.

Another option is to exclude all generation projects from the ERF and use an alternative policy mechanism, such as government power purchase agreements, to incentivise generation at landfills. Using ACCUs to incentivise landfill gas generation is problematic because of the extent of the financial additionality risks and the unpredictability of electricity and LGC prices. Price increases can render abatement non-additional, meaning the issuance of credits can result in higher emissions than would otherwise occur (i.e. if the credits are used to offset emissions). Equally, if electricity and LGC prices decrease significantly, it could force operators to scale back investment in the site, resulting in reductions in their capacity to capture and combust CH_4. Having the government enter into power purchase agreements with landfill generators could avoid this issue and the associated risks of over-crediting or project closure (or reductions in abatement caused by decreases in electricity and LGC prices). A further benefit of this type of approach is the agreements could be structured to allow contract prices to be periodically updated to account for operational and market conditions. This would provide operators with certainty but without locking them into an inflexible process.

The current landfill gas methods do not provide any flexibility or long-term certainty. Indeed, the 5-year crediting period extension that has now been provided to all projects is a stop-gap solution for the industry. At the end of the 5 year extension period, the operators will again face the prospect of losing ACCUs. For the larger projects, this is unlikely to be problematic. However, the situation is different for small to medium-sized landfill gas projects. Based on the available data, there is a reasonable argument a number of these projects need additional incentives to operate, beyond those provided by the electricity and LGC markets.

7. Conclusion

The available data provide compelling evidence that the majority of the abatement credited under the ERF's landfill gas methods has not been additional. It appears that in the order of 2/3^{rds} of the abatement credited under the methods would have occurred in the absence of the incentive provided by the issuance of ACCUs. The non-additional abatement credited under these methods equates to approximately 19.5 million ACCUs, or almost 20% of the total number of ACCUs issued under the ERF to the end of 2021. These credits are likely to have been worth more than $300 million.

The primary flaw in the landfill gas methods is that they do not contain any measures to mitigate the risks associated with financial additionality – the risk the abatement would occur anyway because the activity is profitable without carbon credits. Landfill gas projects that generate electricity (generation projects) can earn revenue through the sale of electricity and LGCs, meaning there is a significant incentive for the activity to be undertaken without the need for ACCUs. This risk is greatest in large sites that are able to benefit from the significant economies of scale that are associated with the operation of landfill gas capture and combustion systems. The additionality problems appear to relate mostly to these larger sites, particularly the 20 largest landfill gas projects that account for almost 70% of the ACCUs that have been issued under the methods.

A further problem with the landfill gas methods is they have allowed old generation projects to transition into the ERF and onto new methods and to carry over their historical baselines. This has allowed the majority of the 20 largest projects in Australia to have baselines of 24% of the methane (CH_4) captured by the projects, below the default of 30%, and for some large projects to have a baseline of 0%. Because the method's only measure for addressing additionality risks is the baseline, projects with a 0% baseline are free from additionality constraints. This aspect

of the method is based on the assumption that, if these projects did not receive ACCUs, the relevant landfills would not capture and destroy any CH_4. This is plausible at some smaller and closed landfills but is inconceivable for larger landfills, which are all regulated under state and territory environmental laws and are required to capture and destroy a proportion of the biogas released from the site to mitigate odour and safety risks.

In 2018, the ERAC conducted a crediting period extension review on the original ERF method and found that generation projects were likely to continue in the absence of the incentive provided by the ERF and that extending the crediting period for generation projects was not likely to lead to the registration of new projects. On this basis, the ERAC recommended that the crediting period for generation projects should not be extended. This should have addressed the additionality concerns associated with generation projects. Generation projects would have one, 7-year crediting period as was originally intended and then cease receiving ACCUs. However, for reasons that are unclear, the Minister for Emissions Reductions decided to grant these projects a further 5-year extension. In order to do this, he had to make a new method (the new generation-only method) so as to get around the ERAC's original advice.

Despite compelling evidence that the majority of the abatement issued under the methods has been non-additional, and prevailing market conditions strongly suggesting the largest generation projects will remain viable without ACCUs until at least 2025, the ERAC found the new generation-only method satisfied the offsets integrity standards. The key question is how; how, in light of the available evidence could the ERAC reasonably conclude the method satisfies the offsets integrity standards?

For the ERAC to reach this conclusion it would need to be satisfied there was *compelling evidence* that:

c) large generation projects need ACCUs to continue operating – i.e. they are likely to shut down or substantially reduce their biogas capture and combustion rates if they do not continue to receive ACCUs for a further 5 years; and

d) the baselines are appropriately calibrated to account for the regulatory and market factors that incentivise the activity if ACCUs are not provided.

However, the available evidence suggests:

- there are material financial incentives for generation projects to operate, even without ACCUs, because they can receive revenue from the sale of both electricity and LGCs;
- the new generation-only method contains no measures to mitigate the risks associated with financial additionality;
- the new generation-only method allows all of the large generation projects to continue to use the baselines they have been using to date, including those on baselines of 0% and 24%, which are below the minimum 30% level recommended by the ERAC in 2019; and
- electricity and LGC prices are likely to remain in a range that is sufficient to ensure the continued profitability of the larger generation projects that account for the majority of the ACCUs until at least 2025.

The ERAC has claimed its decision to support the method was based on 'new analysis'. However, neither the analysis nor any information on its coverage of projects, price assumptions or how it was conducted has been released.

If the ERAC and Minister are unable to provide compelling evidence that supports their decisions, the new generation-only method should be revoked and replaced with a method that employs a tiered baseline system, where projects receive different baseline capture rates that account for the economies of scale associated with their operation. The baseline tiers should then be reviewed and revised on 5-yearly cycles to ensure they reflect prevailing market conditions, similar to what occurs with infrastructure assets that are subject to price regulation.

Another option is to exclude all generation projects from the ERF and use an alternative policy mechanism, such as government power purchase agreements, to incentivise generation at landfills. Using ACCUs to incentivise landfill gas generation is problematic because of the extent of the financial additionality risks and the unpredictability of electricity and LGC prices. Prices increases can render abatement non-additional, meaning the issuance of credits can result in higher emissions than would otherwise occur (i.e. if the credits are used to offset emissions). Equally, if electricity and LGC prices decrease significantly, it could force operators to scale back investment in the site, resulting in reductions in their capacity to capture and combust CH_4. Having the government enter into power purchase agreements with landfill generators could avoid this issue and the associated risks of over-crediting or project closure (or reductions in abatement caused by decreases in electricity and LGC prices).

While most of the abatement credited under the ERF's landfill gas method is unlikely to be additional, and the new generation-only method does not appear to satisfy the offsets integrity standards, it is important to emphasise that there are legitimate landfill gas projects that are likely to have generated, and continue to generate, real and additional abatement. Flaring-only projects, and many small- to medium-sized generation projects, are likely to need additional incentives beyond the ability to sell electricity and LGCs to be viable. The different characteristics of these projects relative to the large generation projects needs to be accounted for in the design of policy incentives for the sector.